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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/672,644	09/28/2000	Tetsu Koyama	M-9579 US	7976

33031 7590 11/19/2003

CAMPBELL STEPHENSON ASCOLESE, LLP  
4807 SPICEWOOD SPRINGS RD.  
BLDG. 4, SUITE 201  
AUSTIN, TX 78759

EXAMINER

VARTANIAN, HARRY

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 11/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/672,644

Applicant(s)

KOYAMA ET AL.

Examiner

Harry Vartanian

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 12-14, 17-22, 26, 27, 33-35, 38 and 39 is/are rejected.
- 7) ☒ Claim(s) 7-11, 15, 16, 23-25, 28-32, 36 and 37 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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**Detailed Action**

***Drawings***

1. Figure 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Specification***

2. The disclosure is objected to because of the following informalities: In the "*Brief Description of the Drawings*" the descriptions for figures 3 and 4 are misrepresented. Figure 3's description describes Figure 4 and vice-versa. Please switch the descriptions.

Appropriate correction is required.

3. The abstract of the disclosure is objected to because it is too long. Abstract must not contain more than 25 lines/150 words. Correction is required. See MPEP § 608.01(b).

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 26 and 27 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The variables used in the equations are critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the

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disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Each variable( $e_n$ ,  $\mu$ ,  $Z_n$  etc..) must be defined in order for equation to be included in Claims.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 12, 13, 19-21, 33 and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Nobakht( US Patent #6,009,120). Regarding Claims 1, 12, 19, 21 and 33 Nobakht discloses the use of multi-dimensional equalizer(abstract) for "eliminating" ISI (Column 5, Lines 29-33) in a Gigabit Ethernet system with input and output vectors(fig 3). Moreover, Nobakht discloses a multi-dimensional equalizer where "coefficients...are adjusted on the basis of an error signal  $e_1$  determined by comparing the output and input of the preliminary decision device 150." (Column 6, Lines 60-67 to Column 7, Line 1) Nobakht also discloses the use of a decision device and a plurality of filter taps in Fig 3.

Regarding Claims 13, 20, and 34 Nobakht discloses the use of FIFO buffers that store the input symbols before equalization. A buffer can be used as a delay element, therefor meeting the Claim limitations(Column 7, Lines 5-25).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2, 3, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nobakht in view of Choi(US Patent #5,675,394). Nobakht meets all the limitations of Claims 2, 3, and 6 please see above paragraphs, for a multi-dimensional equalizer where "coefficients...are adjusted on the basis of an error signal  $e_1$  determined by comparing the output and input of the preliminary decision device 150." (Column 6, Lines 60-67 to Column 7, Line 1)

What Nobakht fails to disclose is the use of the steepest decent gradient operator.

However, Choi discloses the use of "...minimization of the cost function  $D_{sup}(2)$  with respect to the equalizer coefficients can be performed recursively according to a known steepest decent method."(Column 4, Lines 46-54) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that Nobakht's multi-dimensional equalizer use the steepest decent method as disclosed by Choi. The motivation to use steepest decent method is that it is one of the fastest ways to compute error in a multi-dimensional(variable) space, as is the case in a Gigabit Ethernet system.

7. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nobakht and Choi in view of Lechleider(US Patent #5,181,198). Nobakht and Choi meet all

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the limitations of Claims 4 and 5(See above paragraphs), except the use of an echo and NEXT canceller.

However, Lechleider discloses "the receiver incorporates a two-dimensional generalization to a conventional decision feedback equalizer, namely, an implementation to cancel both pre-cursor and post-cursor intersymbol interference as well as far-end crosstalk."(Abstract) In addition, Lechleider discloses the use of an echo canceller in his receiver(Fig 4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that Nobakht's multi-dimensional equalizer and Choi's steepest decent method be combined with Lechleider's equalizer. The motivation to combine is that echo and FEXT cancellers are typical components used in digital receivers to combat miss matches in impedances on the transmission line and cross talk, respectively.

8. Claims 14, 22, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nobakht in view of Loginov et al(ESISS, Paris 9/96 SPRA321). Nobakht meets all the limitations of Claims 14, 22, and 35(See above Paragraphs) except the multiplication of the error vector by a delayed input signal vector.

However, Loginov discloses a multi-dimensional Equalizer with decision feedback that takes delayed input versions of input ( $a''$ ) and combines it with an error vector( $e$ )(Fig 3). He also discloses the method of calculating the "correcting matrix"(Pg. 16) by multiplying the error vector by delayed versions of the input(Fig 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that Nobakht's multi-dimensional equalizer and Loginovs method of calculating an adjusted output vector be combined. The motivation to do so is that the result of error times input signal could be used to adjust the equalizers tap values in order to reduce error.

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9. Claims 17-18 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nobakht in view of Lechleider(US Patent #5,181,198). Nobakht meet all the limitations of Claims 17-18 and 38-39(See above paragraphs), except the use of an echo and NEXT canceller.

However, Lechleider discloses "the receiver incorporates a two-dimensional generalization to a conventional decision feedback equalizer, namely, an implementation to cancel both pre-cursor and post-cursor intersymbol interference as well as far-end crosstalk."(Abstract) In addition, Lechleider discloses the use of an echo canceller in his receiver(Fig 4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that Nobakht's multi-dimensional equalizer be combined with Lechleider's equalizer. The motivation to combine is that echo and FEXT cancellers are typical components used in digital receivers to combat miss matches in impedances on the transmission line and cross talk, respectively.

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***Claim Objections***

10. Claims 7-11, 15, 16, 23-25, 28-32, and 36-37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 703.305.8698. The examiner can normally be reached on 9-5:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703.305.4714. The fax phone number for the organization where this application or proceeding is assigned is 703.872.9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is NONE.

Harry Vartanian  
Examiner  
Art Unit 2634

HV

A handwritten signature in black ink, appearing to read 'Stephen Chin', with a long horizontal line extending to the right.

**STEPHEN CHIN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600**